



RE: Release Abatement Measure Completion Report-Estabrook ES 
Katherine Woodward to: Cynthia Campisano

11/04/2011 02:26 PM

Cyndee- Thanks you. I will include with the file

Katherine Woodward, PE
Environmental Protection Agency
5 Post Office Square, Suite 100
Mail Code: OSRR07-2
Boston, MA 02109-3912
Phone: 617-918-1353

"Cynthia Campisano" Hi Kate, Please see below for responses to y...

11/04/2011 12:33:06 PM

From: "Cynthia Campisano" <CCampisano@eheinc.com>
To: Katherine Woodward/R1/USEPA/US@EPA
Cc: Kimberly Tisa/R1/USEPA/US@EPA, "Matt Fragala" <MFRagala@EHEinc.com>
Date: 11/04/2011 12:33 PM
Subject: RE: Release Abatement Measure Completion Report-Estabrook ES

Hi Kate,

Please see below for responses to your questions. Attached please find the final manifest as requested. If you prefer, I can also provide a memo or update for your records with the responses provided below. Please let me know if you would like a summary document or any other additional information. Thanks for your help.

Cynthia D. Campisano, PG
Senior Scientist/Project Executive
Environmental Health & Engineering, Inc.
781-247-4300

-----Original Message-----

From: Woodward.Katherine@epamail.epa.gov [mailto:Woodward.Katherine@epamail.epa.gov]
Sent: Wednesday, October 26, 2011 12:05 PM
To: Cynthia Campisano
Cc: Tisa.Kimberly@epamail.epa.gov
Subject: Release Abatement Measure Completion Report-Estabrook ES

Cindee,

I reviewed the report and I have a couple of questions/comments before we can close out this portion of the project:

a. Page 4. Section 2.3. The statement is made that one sample collected outside of Classroom 6 had a PCB concentration of 7.4 ppm (refer to Figure B.3, Appendix B). Figure B.3 only has sample numbers. Which room is Classroom 6 and which of the samples has the 7.4 ppm concentration?

Response: Table F.1 summarizes all of the analytical data and provides location identifiers. The sample with a concentration of 7.4 ppm is identified as 113734, and Classroom 6 is adjacent to it.

b. Page 11.

i. Section 5.0. The last paragraph states that Figure B-3 illustrates the Site and excavation locations. Figure B-3 shows the sample locations but not the excavation locations. Figure B-4 shows the excavation locations, but does not show close up sample locations and grid spacings.

Response: Figure B.3 illustrates the excavation locations and the assessment sample locations that determined areas requiring excavation. The excavation locations are shaded in light purple. Subsequent drawings B.4 - B.7, provide more detailed illustrations of the excavation areas, including the sample IDs for clearance samples. The close-up illustrations of sample and grid locations are included in B.5-B.7.

ii. Section 5.1. The first paragraph again refers to Figure B-3 when discussing excavation limits.

Response: Same as previous.

c. Page 12. Table 5.1. What is the meaning of "S" and "D" in the column marked sample type?

Response: S = Sample; D = Duplicate

I also need a copy of the Non-hazardous Waste Manifest with Waste Tracking Number NHWM051637 that is signed by the designated facility owner.

If you have any questions please feel free to contact me.

Kate

Katherine Woodward, PE
Environmental Protection Agency
5 Post Office Square, Suite 100
Mail Code: OSRR07-2
Boston, MA 02109-3912
Phone: 617-918-1353
[attachment "Final Manifest 51637.pdf" deleted by Katherine Woodward/R1/USEPA/US]



Release Abatement Measure Completion Report-Estabrook ES

Katherine Woodward to: CCampisano

10/26/2011 12:04 PM

Cc: Kimberly Tisa

Cindee,

I reviewed the report and I have a couple of questions/comments before we can close out this portion of the project:

a. Page 4. Section 2.3. The statement is made that one sample collected outside of Classroom 6 had a PCB concentration of 7.4 ppm (refer to Figure B.3, Appendix B). Figure B.3 only has sample numbers. Which room is Classroom 6 and which of the samples has the 7.4 ppm concentration?

b. Page 11.

i. Section 5.0. The last paragraph states that Figure B-3 illustrates the Site and excavation locations. Figure B-3 shows the sample locations but not the excavation locations. Figure B-4 shows the excavation locations, but does not show close up sample locations and grid spacings.

ii. Section 5.1. The first paragraph again refers to Figure B-3 when discussing excavation limits.

c. Page 12. Table 5.1. What is the meaning of "S" and "D" in the column marked sample type?

I also need a copy of the Non-hazardous Waste Manifest with Waste Tracking Number NHWM051637 that is signed by the designated facility owner.

If you have any questions please feel free to contact me.

Kate

Katherine Woodward, PE
Environmental Protection Agency
5 Post Office Square, Suite 100
Mail Code: OSRR07-2
Boston, MA 02109-3912
Phone: 617-918-1353

LETTER OF TRANSMITTAL

Environmental Health & Engineering, Inc.
117 Fourth Avenue
Needham, MA 02494-2725
PH 781-247-4300 FAX 781-247-4305

To: Ms. Kimberly Tisa
PCB Coordinator
U.S. Environmental Protection Agency
Mail Code: OSRR07-2
Five Post Office Square, Suite 100
Boston, MA 02109-3912

Date: October 12, 2011

Project #: 17228

☒ **Attached** ☐ **Under separate cover, EH&E is sending you the items described below**

No. of Copies	Description
1	RELEASE ABATEMENT MEASURE COMPLETION REPORT AND RESPONSE ACTION OUTCOME STATEMENT RTN-3-29547 ESTABROOK ELEMENTARY SCHOOL 117 GROVE STREET, LEXINGTON, MASSACHUSETTS

Transmitted via: ☐ Mail/Regular ☐ Mail/Priority ☐ Email ☐ Fax
☐ FedEx O/N a.m. ☐ FedEx O/N p.m. ☐ FedEx 2-Day ☒ Courier
☐ Hand-delivered by: ☐ Other

Transmitted: ☐ For your review and comment ☐ Per your request
☒ For your use ☐ For your reference ☐ Other

Notes:

Copy to:

From: Brigid O'Mara

For: Cynthia Campisano/Matt Fragala

**RELEASE ABATEMENT MEASURE COMPLETION REPORT
AND
RESPONSE ACTION OUTCOME STATEMENT
RTN-3-29547
ESTABROOK ELEMENTARY SCHOOL
117 GROVE STREET, LEXINGTON, MASSACHUSETTS**

Prepared For:

**Patrick Goddard
Director of Public Facilities
Town of Lexington
201 Bedford Street
Lexington, MA 02420**

Prepared By:

**Environmental Health & Engineering, Inc.
117 Fourth Avenue
Needham, MA 02494-2725**

**EH&E Report 17228
October 5, 2011**

P:\17228\Soil Remediation Plan\Remediation Close-out Documents\RAM Completion-RAO.doc

**©2011 by Environmental Health & Engineering, Inc.
All rights reserved**

TABLE OF CONTENTS

1.0 INTRODUCTION.....	1
2.0 RELEASE DESCRIPTION AND SITE CONDITIONS	3
2.1 PCB-CONTAINING EXTERIOR BUILDING MATERIALS	3
2.2 SITE SETTING	3
2.3 PRELIMINARY SOIL SAMPLING RESULTS.....	4
2.4 FENCING	5
2.5 FOLLOW-UP SOIL SAMPLING RESULTS.....	5
2.6 CHARACTERIZATION OF EXTERIOR CONCRETE AND LANDSCAPING MATERIALS.....	7
3.0 CONCEPTUAL MODEL	8
4.0 COMPLETED RESPONSE ACTIONS.....	10
4.1 FENCING	10
4.2 SOIL REMOVAL.....	10
4.3 SOIL DISPOSAL	10
5.0 SOIL SAMPLING AND EXCAVATION PROGRAM	11
5.1 EXCAVATION AND SOIL DESCRIPTION.....	11
5.2 EXCAVATION ENDPOINT SAMPLE COLLECTION AND ANALYSIS.....	12
5.3 CONFIRMATORY ENDPOINT ANALYTICAL RESULTS	13
5.4 REMEDIATION WASTE.....	16
5.5 ENVIRONMENTAL MONITORING.....	16
5.6 PERMITS/PUBLIC NOTIFICATION.....	19
5.7 REPRESENTATIVENESS EVALUATION AND DATA USABILITY ASSESSMENT	19
5.8 OTHER INFORMATION REQUIRED BY THE MADEP	25
6.0 METHOD 1/METHOD 3 RISK CHARACTERIZATION	26
6.1 METHOD 1 HUMAN HEALTH RISK CHARACTERIZATION.....	26
6.2 RISK TO THE ENVIRONMENT.....	28
6.3 RISK OF HARM TO SAFETY AND PUBLIC WELFARE.....	29
6.4 UNCERTAINTY ANALYSIS.....	30

TABLE OF CONTENTS (Continued)

7.0 CONCLUSIONS	31
7.1 RAM COMPLETION	31
7.2 FEASIBILITY OF ACHIEVING BACKGROUND	31
7.3 RESPONSE ACTION OUTCOME	32
8.0 REFERENCES	34

LIST OF APPENDICES

Appendix A	Limitations
Appendix B	Figures
Appendix C	Soil Sampling Program Methods
Appendix D	Non-hazardous Materials Manifests
Appendix E	Laboratory Reports
Appendix F	Data Usability Summary Table
Appendix G	EPA Approval and Notification Letters

LIST OF TABLES

Table 5.1	Soil Sample Results for Polychlorinated Biphenyls (PCBs) from Estabrook Elementary School, 117 Grove Street, Lexington, Massachusetts, August 22, 2011
Table 5.2	Quality Assurance and Quality Control (QC) Parameter
Table 5.3	Summary of Air Monitoring Actions Levels, Estabrook Elementary School, 117 Grove Street, Lexington, Massachusetts, Massachusetts
Table 5.4	Results of Continuous Airborne Particle Monitoring (as PM ₁₀) During Active PCB-Remediation Activities, Estabrook Elementary School, 117 Grove Street, Lexington, Massachusetts, August 22 and 23, 2011
Table 6.1	Exposure Scenarios for Estabrook Elementary School, 117 Grove Street, Lexington, Massachusetts
Table 6.2	Comparison of EPC to Clean-up Criteria, Estabrook Elementary School, Lexington, Massachusetts

TABLE OF CONTENTS (Continued)

LIST OF ABBREVIATIONS AND ACRONYMS

ACEC	Areas of Critical Environmental Concern
AUL	Activity and Use Limitation
BWSC	MADEP Bureau of Waste Site Cleanup
CFR	Code of Federal Regulations
CMR	Code of Massachusetts Regulations
EH&E	Environmental Health & Engineering, Inc.
EPA	U.S. Environmental Protection Agency
EPC	exposure point concentration
LSP	Licensed Site Professional
MADEP	Massachusetts Department of Environmental Protection
mg/m ³	milligrams per cubic meters
PCB	polychlorinated biphenyl
ppm	parts per million
RAM	Release Abatement Measure
RAO	Response Action Outcome
RTN	Release Tracking Number
School	Estabrook Elementary School
Site	117 Grove Street, Lexington, Massachusetts
µg/m ³	micrograms per cubic meter

1.0 INTRODUCTION

The objective of this report is to provide a Release Abatement Measure (RAM) Completion Report and Class A-2 Response Action Outcome (RAO) Statement for the release of non-authorized polychlorinated biphenyls (PCBs) in soil at the Estabrook Elementary School (the School) located at 117 Grove Street, Lexington, Massachusetts (the Site). In addition, this report provides close-out documentation required by the U.S. Environmental Protection Agency (EPA) for remediation of PCBs in soil at the Site. This document includes discussion of activities completed following notification to the Massachusetts Department of Environmental Protection (MADEP) and EPA, and approval to conduct excavation and removal of contaminated soil.

An historic release of PCBs to soil was discovered subsequent to an assessment of building materials that were found to contain regulated concentrations of PCBs under EPA regulations. MADEP was notified of the release on September 28, 2010, via a Release Notification Form. MADEP issued Release Tracking Number (RTN) 3-29547 for the Site.

In response to sampling results, the Town of Lexington contracted Environmental Health & Engineering, Inc. (EH&E) to develop and submit an abatement protocol to address the presence of non-authorized PCBs in soil at the Site. This work plan was prepared to support an application for a Title 40 Code of Federal Regulations (CFR) self-implementing disposal plan, as outlined at EPA 40 CFR 761.61(a) for disposal of soils impacted by non-liquid PCBs. In addition, the RAM Plan was prepared in accordance with the provisions of the Massachusetts Contingency Plan (MCP) at Title 310 Code of Massachusetts Regulations (CMR) Section 40.0444.

This RAM Completion Report and RAO Statement submittal is an integral part of, and is incorporated by reference to, the RAM Transmittal Form (BWSC-106) and RAO Transmittal Form (BWSC-104) provided electronically through eDEP. This document, the opinions stated herein, and its Appendices are subject to the complete *Limitations* that are provided in Appendix A, and are incorporated by reference into any Licensed Site Professional (LSP) Opinion to which the document is attached.

The Response Actions conducted to achieve the RAO included the removal of regulated soils associated with previously abated and regulated exterior building caulk. The soils were disposed as PCB bulk remediation waste. The soil abatement was performed to achieve a cleanup criterion of 1 part per million (ppm) or less for unrestricted use and disposal in accordance with EPA regulations. This standard is more protective than the MCP Method 1 S1 Soil Clean-up Standard of 2 ppm.

As required for submission of a RAM Completion Report and RAO Statement, contact Information is provided:

Patrick Goddard
Director of Public Facilities
Town of Lexington
201 Bedford Street
Lexington, MA 02420
(781) 274-8958

2.0 RELEASE DESCRIPTION AND SITE CONDITIONS

The following sections describe assessment activities and response actions conducted previously at the School, including characterization of PCBs in building materials and soil adjacent to the building.

2.1 PCB-CONTAINING EXTERIOR BUILDING MATERIALS

In 2010, EH&E performed a series of investigations to identify suspect PCB-containing caulk and sealants used throughout portions of the School. EH&E collected samples in a manner to investigate the installation and application of caulk/sealant materials, including an evaluation of any evidence indicating window caulk/sealant replacement or repair work.

The analytical results indicated the presence of PCBs in select caulks/sealants present in the interior and exterior of the School. In response to the sampling results, a detailed and thorough abatement and encapsulation protocol was implemented at the School to address the presence of PCBs in building materials. The abatement work completed to date involved the removal or encapsulation, as appropriate, of the PCB caulks/sealants throughout the interior and exterior of the School. The abatement work included removal of approximately 550 linear feet of white PCB caulk around exterior windows. Work also included the cleaning of porous and non-porous materials that are in contact with the PCB caulking, followed by application of an encapsulant that was used to seal the residual PCBs within the porous substrates. Additional exterior encapsulation was conducted during the spring of 2011.

2.2 SITE SETTING

The school is located in suburban Lexington, Massachusetts. Surrounding properties are primarily residential. The school is a public elementary school. There are no institutions within 500 feet of the Site. The Site locus is illustrated in Figure B.1 in Appendix B.

Review of the MADEP GIS map for RTN-3-29547 (Figure B.2) indicates that Protected Open Spaces are present north and south of the school within 500 feet. No Areas of

Critical Environmental Concern (ACECs), Rare Wetland Habitats, Certified Vernal Pools, or Public Water Supply (PWS) Protection Areas are located within one half mile of the Site. A Zone II PWS Protection Area is located just beyond the half mile radius to the southeast. The nearest wetlands and surface water bodies are located approximately 500 feet north of the Site. Additional wetlands are located at greater distances within one half mile of the Site to the west and south.

For MCP compliance, and based upon the review of the Site setting, S1 soil clean-up standards are considered applicable for Site evaluation. Soils at the Site were impacted within the top two feet of soil (accessible), are located adjacent to an elementary school building within a residential neighborhood, and unrestricted reuse of these soils is desired. Child and adult frequency of use is categorized as High. Because the grounds in part are used for recreational sports, the intensity of use is categorized as High.

Although ground water is not anticipated to be impacted at the Site, all categories of ground water are potentially applicable at the Site (GW-1, GW-2, GW-3).

2.3 PRELIMINARY SOIL SAMPLING RESULTS

A limited surficial soil sampling effort was conducted by EH&E on August 11, 2010, as described in the March 18, 2011, sampling plan (EH&E, 2011). This program included collection of four samples (plus a duplicate) around the section of the School containing Classrooms 1 – 6. Soils from three of the four locations detected PCB concentrations ranging from 0.12 – 0.14 ppm (Table F.1, Appendix F). Sample locations are shown in Figure B.3 in Appendix B.

One sample collected outside Classroom 6 had a PCB concentration of 7.4 ppm (refer to Figure B.3, Appendix B). This concentration constitutes a reportable release under the MCP. Because this is a historic release of PCBs and did not exceed the 10 ppm threshold for classification as an Imminent Hazard as defined by the MCP, notification was required within a maximum of 120 days. EH&E, on behalf of the Town of Lexington, notified MADEP (via a Release Notification Form) of the release to soils on September 28, 2010, and MADEP assigned a RTN (3-29547) to the Site.

2.4 FENCING

Subsequent to the discovery of PCBs in soils at the School, fencing was installed around the building perimeter in all areas where PCB-containing caulk was installed on the building exterior. This fencing was located approximately 10 feet from the building wall except in areas bounded by sidewalk where the fence was installed closer to the building adjacent to the sidewalk. The purpose of this fencing was to minimize access to potentially impacted soils. This fencing was removed subsequent to soil removal and receipt of confirmatory analyses indicating that the clean-up criterion of 1 ppm was met at all locations.

2.5 FOLLOW-UP SOIL SAMPLING RESULTS

A follow-up sampling program was implemented on June 13 and 14, 2011, and July 13 – 15, 2011, by EH&E to characterize the nature and extent of PCBs in soil and adjacent exterior building/landscaping materials at the Estabrook Elementary School. This soil sampling program was performed after the removal and encapsulation of PCB-containing caulk on the exterior of the building. Appendix C provides a description of soil sampling and analysis methods.

This soil sampling program was designed to provide a more detailed characterization of PCB-contaminated soils along the perimeter of the School in accordance with methodology outlined in 40 CFR 761. This program also complied with the MCP (310 CMR 40). The soil sampling program was conducted in accordance with the plan dated and submitted to EPA for approval on March 18, 2011, (EH&E, 2011) and recommendations provided by the EPA after its review of the plan.

The soil sampling results characterized surficial soils with respect to potential PCB contamination through the collection of representative samples in close proximity (within approximately one foot) to the former locations of PCB-containing caulk lines around the perimeter of the School. In addition, a targeted sampling program was performed in landscaped areas where soils may have been disturbed at greater depths.

Sixty-four composite soil samples were collected along the perimeter of the School on June 13 and 14, 2011. Total PCB concentrations in soil were below the regulatory

criterion of 1 ppm in 54 of the 64 samples. These results, including laboratory reports, were provided in the previously submitted RAM Plan. Ten samples contained a total PCB concentration greater than the EPA criterion of 1 ppm total PCBs. PCB concentrations above the EPA criterion were found only in samples collected 0 – 3 inches below ground level. Two samples had a concentration above the MADEP Method 1 S1 soil clean-up standard of 2 ppm (Table F.1).

No sample had a concentration in excess of 10 ppm, a level that constitutes an Imminent Hazard under the MCP. All samples were collected within the restricted area bounded by fencing.

Based upon these and previous results of testing at the School, EH&E recommended focused additional testing to further define the extent of contamination at the regulated locations. This sampling was conducted on July 13 – 15, 2011. During the follow-up testing, EH&E collected samples from 3 – 6 inches below ground surface at seven locations where previous results exceeded 1 ppm and deeper samples were not collected. In addition, EH&E also collected samples in the same areas where previous exceedances occurred, but further (approximately 4 feet) from the building to evaluate lateral extent of contamination. Detailed results of this testing were also provided in the previously submitted RAM Plan and are included in Table F.1.

For both rounds of testing, the samples were collected as composites over a 10-foot length of the building in areas where regulated PCB-containing caulk was present. Results generally indicate that soils concentrations are below 1 ppm at a distance of 4 feet from the building perimeter, and at depths below 3 inches. Slight exceedances of the 1 ppm criterion were observed at two locations S22B and SF33.

Therefore, it was recommended that soils be excavated and disposed off-site in all areas exhibiting concentrations greater than 1 ppm total PCBs. In most affected areas this required removal of soils a minimum of 6 inches deep and to a lateral distance of four feet from the building as illustrated in Figures B.3 and B.4. At location S22B it was recommended that soils be removed to a depth of at least 9 inches and at SF33 removal was completed to a depth of at least 6 inches and a lateral distance of approximately

5 feet from the building which is the edge of pavement. Removal was conducted over the entire 10-foot grid opening represented by each sample.

2.6 CHARACTERIZATION OF EXTERIOR CONCRETE AND LANDSCAPING MATERIALS

In addition to follow-up soil sampling, EH&E also collected samples of exterior building materials adjacent to soils with concentrations exceeding 1 ppm total PCBs. On July 15, 2011, EH&E collected 11 samples of concrete and landscaping materials for analysis of PCBs via EPA Method 8082 with Soxhlet extraction. These samples included slate pavers, mortar, and concrete from air intakes and other structures located adjacent to impacted soils. As described in the previously submitted RAM Plan, concentrations of PCBs were not detected at concentrations above 1 ppm at any of the locations tested. Therefore, no further response actions were conducted for these materials.

3.0 CONCEPTUAL MODEL

Based on current information, the Site conceptual model is that a slow leaching of PCBs from caulk or intermittent releases of caulk directly to the soil resulted in localized surficial soil impacts. It is assumed that the caulk was installed at the time of original building construction, which was in 1964. This model is consistent with typical PCB weathering patterns for exterior caulk observed at other sites. These surficial impacts appear to have been limited to soils in close proximity to the building at some locations where the caulk was installed. PCBs tend to sorb to soils, have low solubilities, and therefore have relatively low mobility in the environment. Therefore, the contamination was not widespread laterally or with depth in soils at the Site. Exterior caulking was remediated in 2010 and 2011 prior to soil remediation at the Site.

Interviews with school staff indicated that soils in close proximity to the building were never moved to other locations at the property. Soil disturbance was likely limited to landscaping activities proximal to the building. Landscaped areas were evaluated at greater depths during the assessment of the Site.

Ground water was not observed in any of the excavations. The relative insolubility of PCBs, the solid phase source material, and the lack of PCBs in soils at depths greater than 9 inches suggested that impacts to ground water at the Site was unlikely. Likewise, the very limited lateral extent of surface contamination, and the absence of surface water and catch basins in close proximity to the building does not indicate impacts to surface water. Therefore, sampling and analysis of ground water and surface water were not conducted at the School.

Potential human receptors at the Site include students, staff, contractors, consultants, and visitors at the Estabrook School. Access was restricted by fencing prior to soil removal and receipt of confirmatory analyses, thus minimizing potential exposures to impacted soil.

No surface water, wetlands, ACECs, Rare Wetland Habitats, Certified Vernal Pools, nor Public Water Supply (PWS) Protection Areas are located in close proximity to the Site (as described previously in Section 2.2 Site Setting). No stressed vegetation is present,

and the affected area is extremely small and unlikely to support a balanced terrestrial habitat.

The Disposal Site Boundary is illustrated in Figure B.3.

4.0 COMPLETED RESPONSE ACTIONS

The following response actions have been completed to date:

4.1 FENCING

Subsequent to the discovery of PCBs in soils at the School, fencing was installed around the building perimeter in all areas where PCB-containing caulk was installed on the building exterior. This fencing was located approximately 10 feet from the building wall except in areas bounded by sidewalk where the fence was installed closer to the building adjacent to the sidewalk. This fencing was removed subsequent to soil removal and receipt of confirmatory analyses indicating that the clean-up criterion of 1 ppm was met at all locations.

4.2 SOIL REMOVAL

Between August 22 and August 23, 2011, soil removal was completed in five separate locations adjacent to the School structure. Approximately 28 tons (approximately 33.6 cubic yards) of soil were removed during the two day excavation period. Figures B.4 through B.7 in Appendix B identifies the areas where soils were excavated across the Site.

Excavation grid end-point soil sample analytical results (see Section 5.2) indicate that for each of the excavation areas, PCBs detected were well below the 1 part per million standard set by the EPA, and well below applicable MCP risk-based clean up standards.

4.3 SOIL DISPOSAL

Soils removed from the Site were shipped to Waste Management's Turnkey landfill in Rochester, New Hampshire, as a non-hazardous non-regulated material. Turnkey is a RCRA Title D landfill that is licensed to accept wastes containing less than 50 ppm total PCBs. Approximately 28 tons of material were disposed off-site. Completed non-hazardous waste manifests are included in Appendix D.

5.0 SOIL SAMPLING AND EXCAVATION PROGRAM

The soil removal, disposal, and confirmatory sampling program were completed in accordance with the *Release Abatement Measure Plan/Self-Implementing Disposal Plan for Remediation of PCBs in Soil: Estabrook Elementary School, 117 Grove Street, Lexington, Massachusetts* completed by EH&E and submitted on August 5, 2011. EPA issued an approval letter for the plan on August 18, 2011.

In accordance with the RAM Plan, EH&E collected confirmatory (end point) soil samples for laboratory analysis. These samples were collected in each excavation area. Each excavation area was mapped with contiguous grids of five feet square. Within each grid, discrete samples from the excavation were composited and submitted for laboratory analysis. Each soil sample represents an end point composite from one of the five-square-foot grids in the excavation areas.

Figure B.3 illustrates the Site and excavation locations, while Figures B.4 through B.7 show close up sample locations and grid spacing at each excavation.

5.1 EXCAVATION AND SOIL DESCRIPTION

The soil removal activities began on August 22, 2011, and were concluded on August 23, 2011. Approximate excavation limits are shown on Figure B.3.

The extent of the excavations was based upon results of previous sampling rounds. Soil sampling conducted between June and July 2011 generally indicated excavation areas should extend five feet beyond the exterior of the building and at least six inches below ground surface (with the exception of one five-foot grid in Excavation Area 1 that extended to at least 9 inches below ground surface). Sampling results also identified the lateral extent along each exterior wall. Soil sample SE-13 and its associated grid on Figure B.3 represents the excavation area where the vertical extent to the base is at approximately 9 inches below ground surface.

Throughout the excavation areas, excavated soils generally appeared as a light to dark brown, fine to medium silty-sand. The Garden Area (Excavation Area 5) soil characteristics were different and are best described as dark brown silt with organics.

Soils were removed on August 22 and 23, 2011, with the use of a back hoe and hand tools. All soil and vegetation removed from these areas, including bushes and shrubs within the Garden Area (Excavation Area 5 Figure B.6) were disposed of in lined roll off containers and sent under non-hazardous manifest to Turnkey.

5.2 EXCAVATION ENDPOINT SAMPLE COLLECTION AND ANALYSIS

Figure B.4 in Appendix B is a site plan illustrating the approximate excavation locations.

Composite soil samples were obtained upon completion of excavation activities within each excavation area. EH&E utilized information obtained during previous investigations to identify the lateral and vertical extents of each excavation area. Confirmatory end point soil samples were obtained within each five-foot grid using hand tools that were decontaminated between uses.

During soil excavation activities, subsurface conditions were noted and logged. Once the samples were collected in accordance with established procedures, they were shipped under chain of custody to Alpha Analytical of Westborough, Massachusetts for subsequent analysis.

Samples were analyzed for PCBs via EPA Method 8082 with Soxhlet extraction and in accordance with the MADEP Compendium of Analytical Methods.

Confirmatory soil sample analytical results are summarized in Table 5.1 and locations of the soil samples obtained during excavation activities are shown on Figures B.4 through B.7.

5.3 CONFIRMATORY ENDPOINT ANALYTICAL RESULTS

On August 22 and August 23, 2011, a total of 36 confirmatory end point samples were collected from each of the six excavation areas (Figures B.4 – B.7). As described in prior sections, these composite samples were collected from the completed excavations with a frequency of testing of one composite from each five-foot grid within each of the six excavations.

Prior to sample collection at each excavation, the area was separated into five-foot grid sections in accordance with EPA TSCA regulations (Subpart O). If necessary, this sampling strategy allows focused follow-up remedial activities, and provides representative coverage for clearance.

As shown in Table 5.1, results of end point soil samples obtained from each of the five-foot grids indicated concentrations of PCBs were well below the MADEP Method I S-1 risk-based standard of 2 ppm and met the EPA project clearance criterion of 1 ppm. Trace levels of PCBs were detected in some of the samples, however, calculated total PCB concentrations were consistently below 1 ppm.

Table 5.1 Confirmatory Soil Sample Results for Polychlorinated Biphenyls (PCBs) from Estabrook Elementary School, 117 Grove Street, Lexington, Massachusetts, August 22, 2011								
Sample ID	Map Location	Sample Depth	Sample Type	Aroclor Concentration (ppm _w)				Total PCB Concentration ¹ (ppm _w)
				1242 Result	1248 ¹ Result	1254 ¹ Result	1260 Result	
126736	SE1	6"	S	0.054	BRL <0.034	BRL <0.034	BRL <0.034	0.054
126737	SE1	6"	D	0.067	BRL <0.034	BRL <0.034	BRL <0.034	0.067
126759	SE2	6"	S	BRL <0.033	BRL <0.033	0.308	0.178	0.486
126740	SE3	6"	S	BRL <0.037	BRL <0.037	BRL <0.037	BRL <0.037	BRL <0.037
126741	SE4	6"	S	BRL <0.035	BRL <0.035	BRL <0.035	BRL <0.035	BRL <0.035
126742	SE5	6"	S	BRL <0.034	0.064	BRL <0.034	0.040	0.104
126743	SE6	6"	S	0.084	BRL <0.036	BRL <0.036	0.049	0.133
126744	SE7	6"	S	BRL <0.036	BRL <0.036	BRL <0.036	BRL <0.036	BRL <0.036
126745	SE8	6"	S	BRL <0.037	BRL <0.037	BRL <0.037	BRL <0.037	BRL <0.037
126746	SE9	6"	S	BRL <0.03	BRL <0.036	BRL <0.036	BRL <0.036	BRL <0.036

Table 5.1 Continued

Sample ID	Map Location	Sample Depth	Sample Type	Aroclor Concentration (ppm _w)				Total PCB Concentration ¹ (ppm _w)
				1242 Result	1248 ¹ Result	1254 ¹ Result	1260 Result	
126747	SE9	6"	D	BRL <0.036	BRL <0.036	BRL <0.036	BRL <0.036	BRL <0.036
126748	SE10	6"	S	BRL <0.038	0.012	BRL <0.038	BRL <0.038	0.012
126749	SE11	6"	S	BRL <0.039	0.063	BRL <0.039	BRL <0.039	0.063
126750	SE12	6"	S	BRL <0.036	BRL <0.036	BRL <0.036	BRL <0.036	BRL <0.036
126751	SE13	9"	S	BRL <0.036	BRL <0.036	BRL <0.036	BRL <0.036	BRL <0.036
126754	SE14	6"	S	BRL <0.037	BRL <0.037	BRL <0.037	BRL <0.037	BRL <0.037
126755	SE15	6"	S	BRL <0.036	BRL <0.036	BRL <0.036	BRL <0.036	BRL <0.036
126756	SE16	6"	S	BRL <0.035	BRL <0.035	BRL <0.035	BRL <0.035	BRL <0.035
126757	SE17	6"	S	BRL <0.034	BRL <0.034	BRL <0.034	BRL <0.034	BRL <0.034
126758	SE18	6"	S	BRL <0.034	BRL <0.034	BRL <0.034	BRL <0.034	BRL <0.034
126760	SE19	6"	S	BRL <0.039	BRL <0.039	0.430	0.306	0.739
126761	SE20	6"	S	BRL <0.036	BRL <0.036	0.319	0.269	0.588
126762	SE21	6"	S	BRL <0.038	BRL <0.038	BRL <0.038	BRL <0.038	BRL <0.038
126763	SE21	6"	D	BRL <0.037	BRL <0.037	BRL <0.037	BRL <0.037	BRL <0.037
126766	SE22	6"	S	BRL <0.037	BRL <0.037	BRL <0.037	BRL <0.037	BRL <0.037
126767	SE23	6"	S	BRL <0.042	BRL <0.042	BRL <0.042	BRL <0.042	BRL <0.042
126768	SE23	6"	D	BRL <0.042	BRL <0.042	BRL <0.042	BRL <0.042	BRL <0.042
126771	SE24	6"	S	BRL <0.043	BRL <0.043	BRL <0.043	BRL <0.043	BRL <0.043
126772	SE25	6"	S	BRL <0.041	BRL <0.041	BRL <0.041	BRL <0.041	BRL <0.041
126773	SE26	6"	S	BRL <0.188	BRL <0.188	0.840	BRL <0.188	0.840
126774	SE27	6"	S	BRL <0.040	BRL <0.040	BRL <0.040	BRL <0.040	BRL <0.040
126775	SE28	6"	S	BRL <0.037	BRL <0.037	BRL <0.037	BRL <0.037	BRL <0.037
126776	SE29	6"	S	BRL <0.038	BRL <0.038	BRL <0.038	BRL <0.038	BRL <0.038
126777	SE30	6"	S	BRL <0.042	BRL <0.042	BRL <0.042	BRL <0.042	BRL <0.042
126778	SE31	6"	S	BRL <0.039	BRL <0.039	BRL <0.039	BRL <0.039	BRL <0.039
126779	SE32	6"	S	BRL <0.041	BRL <0.041	BRL <0.041	BRL <0.041	BRL <0.041

Table 5.1 Continued

Sample ID	Map Location	Sample Depth	Sample Type	Aroclor Concentration (ppm _w)				Total PCB Concentration ¹ (ppm _w)
				1242 Result	1248 ¹ Result	1254 ¹ Result	1260 Result	
126780	SE33	6"	S	BRL <0.041	BRL <0.041	BRL <0.041	BRL <0.041	BRL <0.041
126781	SE34	6"	S	BRL <0.036	0.143	BRL <0.036	BRL <0.036	0.143
126782	SE35	6"	S	BRL <0.037	BRL <0.037	BRL <0.037	BRL <0.037	BRL <0.037
126783	SE36	6"	S	BRL <0.037	BRL <0.037	BRL <0.037	BRL <0.037	BRL <0.037

ppm_w parts per million by weight

BRL concentration is below reporting limit for analyte

NA not applicable

¹ PCB concentration analysis performed by Alpha Analytical, Inc., using U.S. Environmental Protection Agency (EPA) Method 8082 (GC/ECD).

Only Arochlors with detections above the BRL are listed above.

In addition to the confirmatory soil samples, EH&E collected field duplicate and matrix spike duplicate samples at a frequency of 10% of the total number of samples as set forth in the RAM Plan submitted by EH&E on August 5, 2011. Table 5.2 below identifies the duplicate and matrix spike duplicate sampling protocol approved by the EPA.

Table 5.2 Quality Assurance and Quality Control (QC) Parameter

Data Quality Indicators	Measurement Performance Criteria	QC Sample and/or Activity Used to Assess Measurement Performance	Frequency
Soil Samples			
Precision—overall	±45%	Field duplicates	Minimum: One per group or 10% of samples
Precision—laboratory	±45%	1. Matrix spike 2. Matrix spike duplicates	Minimum: One per analysis
Accuracy/bias	±45%	1. Matrix spike 2. Matrix spike duplicates	Minimum: One per group or 10% of samples
Accuracy/bias	Acceptable QC range based on analytical technique	Laboratory control samples (LCS)	Double column gas chromatograph (GC) Surrogate compound
Comparability	Not applicable	Comparability check	Double column GC
Data completeness	90% Overall	Data completeness check	
Sensitivity	±100%	1. Laboratory fortified blank 2. Low calibration standard	Minimum: One per group or 10% of samples

Laboratory Data Reports are included in Appendix E. Data usability is assessed in Section 5.7.

5.4 REMEDIATION WASTE

Disposal of remediation waste was described in Section 4. Soil and vegetation from the excavation areas were shipped to Waste Management's Turnkey Facility in Rochester, New Hampshire, for disposal as a Non-Hazardous Material.

The non-hazardous material waste manifest is included in Appendix D. On September 19 and 20, 2011, three lined roll off containers containing soil and garden materials were shipped to Waste Management's Turnkey Facility with a total of 28 tons of soil for disposal.

Additionally, a drum of rinsate (decon water) generated during equipment decontamination was disposed of at Triumvirate's Facility in Lowell, Massachusetts on September 20, 2011.

5.5 ENVIRONMENTAL MONITORING

Environmental monitoring was conducted to monitor ambient air quality for particulates and ensure safety of site workers and the community during excavation activities.

Air samples were collected using real-time instrumentation to measure airborne dust levels at the perimeter of the work area. Direct reading instruments that continuously measure and log dust concentrations were used to provide a real-time proxy of the effectiveness of control measures and potential PCB concentrations. EH&E deployed one upwind and two downwind stations during each day of excavation.

EH&E utilized real-time, data-logging aerosol monitors to collect and record data for total airborne dust concentrations during the excavation of soils on August 22 and 23, 2011. These measurements were compared to background dust levels collected at the location upwind of the remediation activity. Direct reading instruments that continuously measure and log dust concentrations were used to provide a real-time proxy of the effectiveness of control measures and potential PCB concentrations.

EH&E deployed three (one upwind, two downwind of daily excavation activities) DustTrak™ Model 8520 devices, manufactured by TSI Instruments (St. Paul, Minnesota) to conduct the monitoring. The DustTrak™ instrument measures airborne dust concentrations with an accuracy of one percent and a resolution of 1 µg/m³, using a forward light scattering laser diode. The monitoring range of the DustTrak™ Model 8520 is 0.001 – 100 milligrams per cubic meters (mg/m³). The unit is factory calibrated annually.

The action levels for airborne dust were a maximum one-hour average of 150 micrograms per cubic meter (µg/m³) or an eight-hour average of 50 µg/m³ (see Table 5.3). The action levels for airborne particles during abatement work were based on the National Primary Ambient Air Quality Standard as promulgated by the EPA and as referenced by MADEP. In brief, this standard establishes a maximum 24-hour permissible concentration of 150 µg/m³ for PM₁₀, which includes particulate matter with an aerodynamic diameter of 10 microns or smaller in size. If either of the site-specific action levels was exceeded, the contractor would have been notified and corrective actions taken to reduce dust levels. Table 5.3 summarizes the action levels for airborne particle monitoring.

Table 5.3 Summary of Air Monitoring Actions Levels, Estabrook Elementary School, 117 Grove Street, Lexington, Massachusetts							
IAQ Parameter	Units	Notification Levels	Time Period	Basis	Action Level	Time Period	Basis
PM ₁₀	µg/m ³	150	1-hour Average	NAAQS (24-hr)	150	8-Hour Average	NAAQS (24-hr)
		50	8-Hour Average	Background Data			
IAQ indoor air quality PM ₁₀ particulate matter that is 10 microns or smaller in size µg/m ³ micrograms per cubic meter Notification Remediation Contractor will be notified. NAAQS National Ambient Air Quality Standards							
¹ EPA 40 CFR 50. National Primary and Secondary Ambient Air Quality Standards. <i>Code of Federal Regulations</i> , Title 40 Part 50. Washington, DC: U.S. Environmental Protection Agency. Current as of September 30, 2006. (These standards are designed to protect the general public against adverse health effects. American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc. [ASHRAE] has also adopted these guidelines).							

Perimeter monitoring results indicated that dust levels outside of the remediation area did not exceed the action level at any time during soil remediation activities on August 22 and August 23, 2011. To mitigate low airborne dust generation during excavation activities, a water mist was applied to the excavation area prior to, and during active digging and excavating. Hourly average airborne particulate concentrations ranged between 5 and 6 micrograms per cubic meter with periodic maximum concentrations of 8 to 9 micrograms per cubic meter.

Table 5.4 shows a summary of continuous airborne particle monitoring for airborne dust (PM₁₀) during excavation activities.

Location*	Monitoring Location**	Location Description	Hourly Average Airborne Particle Concentration (µg/m ³)	
			Average	Maximum
August 22, 2011				
Upwind	Southwest	Outside Classroom 3	6	8
Downwind	East	Courtyard	5	7
Downwind	Northeast	Basketball Court	NA***	NA***
August 23, 2011				
Upwind	Northeast	Basketball Court	5	6
Downwind	Southwest	Outside Classroom 3	5	7
Downwind	East	Greenhouse	6	9

PCB polychlorinated biphenyl
PM₁₀ particulate matter that is 10 micrometers or smaller in size
µg/m³ micrograms per cubic meter
NA no data available

* Predominant wind direction during active remediation activities was determined using visual observations.
** Directions relative to the active demolition site on the day of sampling.
*** No data is available due to equipment malfunction.

Particle concentrations generated by soil excavation activities as monitored were well below the notification levels of 50 µg/m³ over eight hours and 150 µg/m³ over 1 hour. No exceedances were reported by any of the downwind monitoring stations. PM₁₀ concentrations never exceeded the action levels at any of the perimeter monitoring stations.

5.6 PERMITS/PUBLIC NOTIFICATION

In accordance with TSCA regulations, EPA approval was required prior to implementation of the soil remediation program. This written approval was received on August 18, 2011, and is included in Appendix G.

To fulfill notification requirements of the U.S. Environmental Protection Agency Title 40 Code of Federal Regulations Section 761.61(a)(3)(i) and the Massachusetts Department of Environmental Protection Title 310 Code of Massachusetts Regulations Section 40.1403 (3), EH&E provided notification to the following agencies prior to beginning Site work:

Mr. Gerard Cody
Health Director
Town of Lexington
1625 Massachusetts Avenue
Lexington, MA 02420

Mr. Carl F. Valente
Town Manager
Town of Lexington
1625 Massachusetts Avenue
Lexington, MA 02420

Mr. Michael Hurley
Bureau of Waste Prevention
Massachusetts Department of Environmental Protection
One Winter Street
Boston, MA 02108

Copies of RAM Plan notification letters are included in Appendix G. Copies of RAO Completion notification letters will be submitted under separate cover via eDEP.

5.7 REPRESENTATIVENESS EVALUATION AND DATA USABILITY ASSESSMENT

A Representativeness Evaluation and Data Usability Assessment (REDUA) is required in accordance with the MCP (310 CMR 40.1056 (2)(k)) and MCP Policy #WSC-07-350 to support the data ultimately relied upon when a RAO Statement is filed for the Site.

The purpose of the Representativeness Evaluation is to document the adequacy of the spatial and temporal data used to support the RAO.

The purpose of the Data Usability Assessment is to document that the data relied upon are scientifically valid and defensible, and of sufficient level of precision, accuracy, and completeness to support the RAO.

5.7.1 Representativeness Evaluation

5.7.1.1 Conceptual Site Model

Representativeness is a qualitative term that describes the extent to which a sampling design adequately reflects the environmental conditions of a site temporally and spatially based upon the Conceptual Site Model (CSM). In developing the CSM, (see Section 3), EH&E considered the following information regarding the Site:

- historical use,
- hydrogeological and physical characteristics,
- contaminant source and type,
- contaminant release mechanism,
- approximate time period of contaminant release,
- release location,
- affected media,
- horizontal and vertical extent of contamination,
- contaminant migration pathways, and
- mechanisms/pathways and points of exposure to the contaminants by human and ecological receptors.

The formation of the CSM was continually updated and either modified or further validated as data were obtained from the sampling programs conducted during response actions described in this document and in prior MCP submittals for this Site. The CSM developed was substantiated by the data collected and no significant data gaps were identified that required filling to develop the CSM any further.

5.7.1.2 Field/Screening Data

No field/screening data other than visual observations were utilized in forming the CSM or as a basis for response action decision making for this Site.

5.7.1.3 Sampling Locations and Depths

Based on the CSM, field observations, and analytical data received over the course of the response actions, EH&E developed the phased sampling programs implemented. The sample locations were selected to test and update the CSM and to represent the various field conditions and types of areas that may require remediation. In particular, EH&E targeted worst-case locations under the drip line of the building beneath PCB-containing caulk. Per direction from EPA, sample frequency significantly exceeded the requirements of 40 CFR 761 Subpart N, which typically requires one sample per 100 square feet. The follow-up sampling programs included one composite sample per approximately every 10 – 20 square feet as requested by EPA representatives.

Sample locations were also chosen both inside and outside areas suspected to be impacted by PCBs to assist in delineating the extent of impacts. The media sampled, sample locations (both spatially and vertically), the density of the sample locations, and sample handling (including sample compositing), are judged appropriate to characterize the concentrations of PCBs in media at the Site and were commensurate with the level of investigation required given Site characteristics. Sample locations are judged sufficient to define the extent of contamination and the Disposal Site boundaries both spatially and vertically.

A sufficient sampling program was conducted to establish that the source of the PCBs has been eliminated or controlled by removal and encapsulation of the building components from which the PCBs originated.

Sampling at sufficient locations and depths was also conducted in support of the RAO regarding:

- identification of pathways/receptors,
- to conclude that Hot Spots are not present at the Site,

- to develop Exposure Point Concentrations (EPCs), and
- to document the conclusion that the Site poses No Significant Risk.

No sampling to determine background concentrations was conducted because background conditions were considered to be the absence of PCBs.

No temporal sampling was judged to be necessary because Site conditions are not expected to affect PCB concentrations due to temporal factors.

No inconsistent information was observed during the work described herein or the data developed from it. No significant data gaps were identified in the sampling locations or depths used to support the RAO.

No information or data collected during the work described herein has been judged to be unrepresentative of Site conditions.

Table F.1 (Appendix F) and Figures B.3 (Appendix B) summarize analytical data that were collected in previous phases of the response actions that are no longer representative of Site conditions because the soil containing the PCBs from which the samples were collected has been removed by remedial response actions.

5.7.2 Field Data Usability Assessment

EH&E utilized appropriate sampling methods to ensure sample integrity. Sample compositing was conducted appropriately for the current and potential future exposure scenarios at the Site. Proper sampling containers were utilized for the analyses conducted. No preservatives were required for any of the field samples. No trip blanks were included in the sampling programs because the only contaminants of concern were PCBs. No equipment blanks were collected. All holding times were met both prior to, and following, extraction. Field duplicates, matrix spikes, and matrix spike duplicates were utilized to assess field accuracy and precision. No field soil screening data were collected to directly support this RAO.

Based upon review of the field quality assurance (QA) procedures implemented and the field data usability assessment, no analytical data were rejected.

5.7.3 Analytical Data Usability Assessment

Sections 4 and 5 and Table F.1 summarize the MCP activities that provided the analytical data reviewed in support of the RAO, including the month and year the data were acquired.

EPA Method 8082 with Soxhlet Extraction by EPA Method 3540C was used for all analyses. These methods comply with EPA and MADEP requirements and were judged to be appropriate for the response actions taken. Some samples required dilution to keep all target analytes within calibration. These samples are noted in Table F.1. However, the reporting limits were still appropriate to quantitatively support the RAO and were lower than the established project action limits for 100% of the samples collected. Project action limits were set to comply with the more conservative of the MCP and EPA regulatory criteria required for cleanup.

5.7.3.1 Precision

Precision is the degree of agreement among repeated measurements of the same characteristic under the same or similar conditions. In general, EH&E collected one duplicate sample for every ten samples collected or 10% of the sample size. No less than one duplicate set was collected, regardless of the sample size. The identity of the duplicate sample(s) was not revealed to the analytical laboratory. The target precision among field duplicates is $\pm 45\%$, indicating good reproducibility. During the soil sampling programs, this criterion was met for 10 of 14 duplicate sample pairs. Soil samples often have significant variability due to the heterogeneous nature of the sample matrix. Therefore, variability levels greater than 45% did not invalidate the sample data set, but were flagged in Table F.1.

5.7.3.2 Accuracy

Accuracy is the extent of agreement between an observed value (sample result) and the accepted or true value of the parameter being measured. The appropriate laboratory QC

program and analytical method determine acceptable recoveries. The laboratories utilized laboratory control samples, matrix spikes, internal standards, surrogates, initial and continuing calibration, reference standards, and blanks to assure accuracy. EH&E reviewed the laboratory analytical data reports regarding laboratory control samples, matrix spikes, matrix spike duplicates, surrogates, and blanks to assess accuracy. In 5 of the 142 samples collected (excluding QC samples) during the response actions (4%), quality control performance standards were not met by the analytical laboratory which resulted in flagging the results as estimated values. For all other samples where a performance standard was not met, the reported value would have a high bias so the reported value was used as a conservative measure. Table F.1 summarizes the data qualification actions taken.

5.7.3.3 Reasonableness

All data were evaluated for reasonableness based on existing knowledge of the Aroclor mixtures in the building environment and on pre-abatement levels. In addition, levels published in the scientific literature were consulted to evaluate the data. Observed concentrations were within ranges observed at other sites in similar settings.

5.7.3.4 Completeness

Completeness is a measure (percentage) of the amount of valid data obtained that meet the data quality objectives. Valid data are results that are soundly founded as evidenced by the data quality indicators. The acceptable completeness percentage for this project is 90%. EH&E collected 100% of the planned samples for this project. Although, some matrix interference and dilution effects impacted a portion of the sample set, all values were utilized as shown in Table F.1 based upon the multiple QA/QC criteria applied to the results.

5.7.4 Summary

The data described in this document have been reviewed in accordance with the MCP and WSC-07-350, including a Field and Analytical Data Usability Assessment. No data were rejected and 96% of the data were used as reported. Four percent of the data

(from 5 sample locations) were flagged as estimated values, however this finding was not judged to be significant because sufficient sampling was done in close proximity to those samples to characterize Site conditions or remediation was subsequently conducted at the sample location. The laboratory data reports indicate that all data are Compendium of Analytical Methods (CAM) Compliant and have met the requirements for Presumptive Certainty. All quality control performance standards were met by the analytical laboratory and the data were used as reported for all endpoint confirmatory samples collected.

Results of the Analytical Data Usability Assessment indicate that no significant data gaps were identified in the data used to support the RAO. The data upon which this RAO has been based are judged to be scientifically valid and defensible, and of sufficient precision, accuracy, representativeness, and completeness to support it.

5.8 OTHER INFORMATION REQUIRED BY THE MADEP

As of the date of this RAM Completion Report/RAO Statement, the MADEP has not required any other information relative to the response actions at the Site.

6.0 METHOD 1/METHOD 3 RISK CHARACTERIZATION

A Method 1 Human Health Risk Characterization and Method 3 Environmental Risk Assessment and evaluation of risk of harm to public welfare were performed to evaluate risk at the School. The following sections provide discussion of risk to human health, safety, public welfare, and the environment.

6.1 METHOD 1 HUMAN HEALTH RISK CHARACTERIZATION

The following paragraphs provide discussion of the Method 1 Risk Characterization completed for the School. A Method 1 Human Health Risk Characterization is appropriate for the Site because contamination is only present in soil. Due to the presence of bioaccumulative compounds in the upper two feet of soil on the Site, Method 3 was used to characterize the risk of harm to public welfare and the environment. In addition, a characterization of the risk of harm to safety was conducted.

6.1.1 Exposure Assessment

EH&E developed exposure scenarios for contaminated soil at the school. As discussed in previous sections, evaluation of the nature and extent of contamination does not indicate the likelihood of ground water nor surface water impacts at this Site.

Under typical site conditions, students, staff, construction workers, visitors, and potential future residents of the Site would have access to impacted soils. Exposure scenarios are described in Table 6.1. As described in Section 2.2, impacted soil at the Site is categorized as S-1 soil, and although ground water is not impacted at the Site, all ground water categories could apply (GW-1, GW-2, GW-3).

Table 6.1 Exposure Scenarios for Estabrook Elementary School, Lexington, Massachusetts		
Activity	Exposure Media	Exposure Pathway
Students/Staff	Soil	Ingestion
		Dermal Contact
	Fugitive Dust	Inhalation
		Ingestion
Construction Worker/ Visitor/Trespasser	Soil	Ingestion
		Dermal Contact
	Fugitive Dust	Inhalation
		Ingestion
Future Resident	Soil	Ingestion
		Dermal Contact
	Fugitive Dust	Inhalation
		Ingestion

For all receptors, the exposure media are soil and fugitive dust. Exposure pathways include ingestion, dermal contact, and inhalation.

6.1.2 Exposure Point Concentrations

The only contaminants of concern at the Site are PCBs. As a conservative simplification the maximum value detected in residual soils (0.840 ppm total PCBs) was selected as the exposure point concentration (EPC) for comparison to MADEP Method 1 and EPA Clean-up Standards. Typically, some form of averaging would be applied, but because all residual soils at the Site passed the applicable criteria, the maximum values were used and EPCs were compared to S-1 standards to avoid consideration of Activity and Use Limitations (AULs). No Hot Spots were identified at the Site.

6.1.3 Risk Characterization

EH&E characterized risk at the Site using Method 1/Method 3 Risk Characterization protocols as described in the MCP and MADEP policies. As such, concentrations of PCBs in soil were compared to published clean-up criteria. This approach ensures that risk levels are acceptable for all potential human receptors at the Site. Further, no AUL is anticipated for this Site, so EH&E's assessment assumes that soils will be fully accessible to potential receptors.

As indicated in Table 6.2, concentrations of PCBs in samples of residual (post remediation) soils at the school are below all Method 1 Clean-up Standards. Table 6.2 includes S-1 soil criteria for GW-1, GW-2 and GW-3 ground water scenarios as designated under the MCP, and the EPA criterion for unrestricted reuse. S-1 soil criteria apply because the intended use for this Site is an elementary school, and therefore high intensity and frequency of use by children could occur for these soils.

Table 6.2 Comparison of EPC to Clean-up Criteria, Estabrook Elementary School, Lexington, Massachusetts					
	EPC	EPA Clean-up Criterion	GW-1/S1	GW-2/S1	GW-3/S1
Concentration (ppmw)	0.840	1	2	2	2
EPC exposure point concentration EPA U.S. Environmental Protection Agency ppmw parts per million per weight					

Table 6.2 Comparison of EPC to Clean-up Criteria, Estabrook Elementary School, Lexington, Massachusetts				
EPC	EPA Clean-up Criterion	GW-1/S1	GW-2/S1	GW-3/S1
Concentration (ppmw)				
0.840	1	2	2	2
EPC exposure point concentration EPA U.S. Environmental Protection Agency ppmw parts per million per weight				

Because none of the residual soil concentrations exceed Method 1 Clean-up Standards (nor the more conservative EPA clean-up criterion), a condition of No Significant Risk of harm to health has been achieved at the Estabrook School Site.

6.2 RISK TO THE ENVIRONMENT

Site remediation has resulted in the removal of PCBs to residual concentrations that are below applicable MADEP Method 1 cleanup criteria (2 ppm) and below TSCA cleanup criteria (1 ppm). However, because PCBs are bioaccumulative and, to a limited extent, remain present within the top two feet of soil at some locations on Site, an

Environmental Risk Characterization is necessary. A Stage I Screening was conducted to determine if a condition of No Significant Risk to the environment exists. The results of the Stage I Screening indicate that Site conditions pose No Significant Risk to the environment. This conclusion is supported by:

- No visible signs of stressed vegetation or other visible signs of impacts to biota were observed at the Site;
- No exceedances of Upper Concentration Limits were identified at the Site; and
- There are no aquatic or wetland habitats on or adjacent to the Site that could reasonably be impacted by the transport of PCBs to those habitats.

Furthermore, an evaluation of terrestrial habitat quality was conducted in accordance with *Guidance for Disposal Site Risk Characterization-Method 3 Environmental Risk Characterization, BWSC/ORS-95-141, April 1996*, as described below.

6.2.1 Evaluation of Terrestrial Habitat Quality

Based on the MA DEP Resource Map (Figure B.2), there are no known state-listed threatened or endangered species, species of special concern, or critical habitats at the Site. No Areas of Critical Environmental Concern (ACECs) have been identified within 0.5 miles of the Site. Therefore, reasonable transport of PCBs to ACECs was ruled out. The total acreage of the undeveloped portion of the affected area is much less than two acres (approximately 0.076 acres) and is non-continuous and adjacent to an active school. Therefore, the area is not sufficient to support a balanced terrestrial community and the need for further assessment and remediation due to potential risks posed to the environment was ruled out.

Based on these findings, a condition of No Significant Risk to the environment has been established for the Site.

6.3 RISK OF HARM TO SAFETY AND PUBLIC WELFARE

The low residual concentrations of PCBs detected in soil at the Site do not pose physical hazards (such as threat of fire or explosion) and are unlikely to create odors or other negative aesthetic effects. No Upper Concentration Limits have been exceeded at the

Site. Site contaminants are not reactive or corrosive. Further no rusted, corroded drums or containers, open pits, lagoons, or other dangerous structures are present at the Site. Therefore, site conditions related to the release under RTN-3-29547 are not considered to pose a risk of harm to safety or public welfare.

6.4 UNCERTAINTY ANALYSIS

Sampling and analysis techniques have inherent uncertainties. These uncertainties are offset by collecting adequate numbers of samples to represent potential exposures. Further the data used in this assessment underwent Presumptive Certainty evaluation as described in Section 5.7.

Method 1 Risk Characterizations employ conservative exposure assumptions and are considered protective for a wide range of receptors. This level of conservatism helps to offset uncertainty related to sampling and analysis limitations. Further, EH&E took an extremely conservative step by using the maximum residual concentrations in soil as the EPC for each COC.

Further, the EPA mandated clean-up criterion of 1 ppm is less than and more conservative than the MADEP S1 Soil Standard of 2 ppm. Therefore at all locations, residual concentrations were even lower than required by the MCP.

7.0 CONCLUSIONS

7.1 RAM COMPLETION

Tasks and objectives were developed for the Release Abatement Measure at the Site. These included:

- Removal of PCB impacted soils at the Site.
- Off-site disposal of up to 28 tons of impacted soil and shrubbery.

All of these tasks have been completed as described in previous report sections and required by the RAM Plan.

Site conditions have been assessed, and no potential or actual Imminent Hazards were identified. There are no known Critical Exposure Pathways at the Site.

Therefore, EH&E concludes that the Release Abatement Measure has been completed and can be closed. An LSP Opinion is provided on the BWSC Transmittal Form, which was submitted via eDEP with this report.

7.2 FEASIBILITY OF ACHIEVING BACKGROUND

For an assessment of the feasibility of achieving background, "background" is considered to be the condition in which the PCBs identified at this Site are not present in Site soil.

Following remedial activities, background conditions for concentrations of PCBs in soil at the Site have not been achieved. Therefore, per 310 CMR 40.0156(2)(e), EH&E conducted an evaluation regarding the feasibility of reducing the concentrations of those compounds to levels that achieve or approach background, as detailed in the MADEP Policy WSC-04-160, *Conducting Feasibility Evaluations Under the MCP* (Policy WSC-04-160).

Because PCBs are persistent contaminants, and the Site is located in an area with S-1 soils, categorical infeasibility to achieve or approach background cannot be supported. Therefore, a Site-specific feasibility evaluation was conducted.

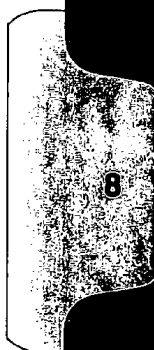
In reviewing the confirmatory end point samples (Table 5.1), no individual sample result exceeds 1 ppm. The highest result observed was 0.890 ppm. The applicable Method I cleanup criterion for soil at the Site is 2 ppm. Therefore, the concentration of PCBs at each sampling location is less than the applicable Method I soil standard. Furthermore, even with the use of the highest individual soil sample result as the EPC, that concentration (0.890 ppm) is much greater than 50% lower than the 2 ppm criterion to achieve No Significant Risk. By definition, therefore, conditions at the Site have approached background.

Remediation of the Site to achieve background conditions could be accomplished from a technological standpoint. However, a cost-benefit evaluation indicated that the additional costs to remediate beyond the existing condition of No Significant Risk to achieve background conditions would be greater than 20 percent of the costs incurred to remediate to No Significant Risk. The incremental cost of conducting additional remediation to achieve background conditions at the Site would be substantial and disproportionate to the incremental benefit of risk reduction, environmental restoration, and monetary and non-pecuniary values. Thus, by definition, it is not feasible to achieve background conditions at the Site.

7.3 RESPONSE ACTION OUTCOME

Based upon the findings presented in this report, a Class A-2 RAO has been achieved for this Site (RTN-3-29547). It is the opinion of Eric S. Wood, Licensed Site Professional #7262, that this Disposal Site is eligible for a Class A-2 RAO because conditions within the Disposal Site boundaries have not been reduced to background, but a condition of No Significant Risk exists at the Site. The source of the contamination at the Site has been removed or controlled. A Representativeness Evaluation and Data Usability Assessment have been completed and no further response actions are judged necessary pursuant to that assessment and evaluation. The Disposal Site boundaries have been adequately defined and a human and environmental risk characterization has

indicated No Significant Risk at the Site under current and reasonably foreseeable future conditions. A Feasibility Evaluation of Achieving Background has been completed and no further response actions are judged necessary pursuant to that evaluation. Further, a Permanent Solution has been achieved and no operation, maintenance, or monitoring are necessary at the Site to confirm or maintain conditions at the Site on which the RAO is based. The RAO Completion Statement, Transmittal Form are submitted via eDEP with this document and public notification documents are included in Appendix G.



8.0 REFERENCES

EH&E. 2011. *Release Abatement Measure Plan/Self-Implementing Disposal Plan for Remediation of PCBs in Soil: Estabrook Elementary School, 117 Grove Street, Lexington, Massachusetts, RTN-3-29547*. Needham, MA: Environmental Health & Engineering, Inc. Dated August 5, 2011.

EPA 40 CFR 50. National Primary and Secondary Ambient Air Quality Standards. *Code of Federal Regulations*. Title 40 Part 50. Washington, DC: U.S. Environmental Protection Agency.

EPA 40 CFR 761. Polychlorinated Biphenyls (PCBs) Manufacturing, Processing, Distribution in Commerce, and Use Prohibitions. *Code of Federal Regulations*. Title 40, Part 761. Washington, DC: U.S. Environmental Protection Agency.

MADEP. 1994. *Background Documentation for Development of the Massachusetts Contingency Plan Numerical Standards*. Boston, MA: Massachusetts Department of Environmental Protection, Bureau of Waste Site Cleanup and Office of Research and Standards.

MADEP. 2004. *Conducting Feasibility Evaluations Under the MCP*. Policy WSC-04-160. Boston, MA: Massachusetts Department of Environmental Protection.
<http://www.mass.gov/dep/cleanup/laws/04-160.doc>

MADEP 310 CMR 40.0000. Massachusetts Contingency Plan. *Code of Massachusetts Regulations*. Title 310 Section 40. Boston, MA: Massachusetts Department of Environmental Protection.